

Retro-Reflector Array for GPS Series III Satellites

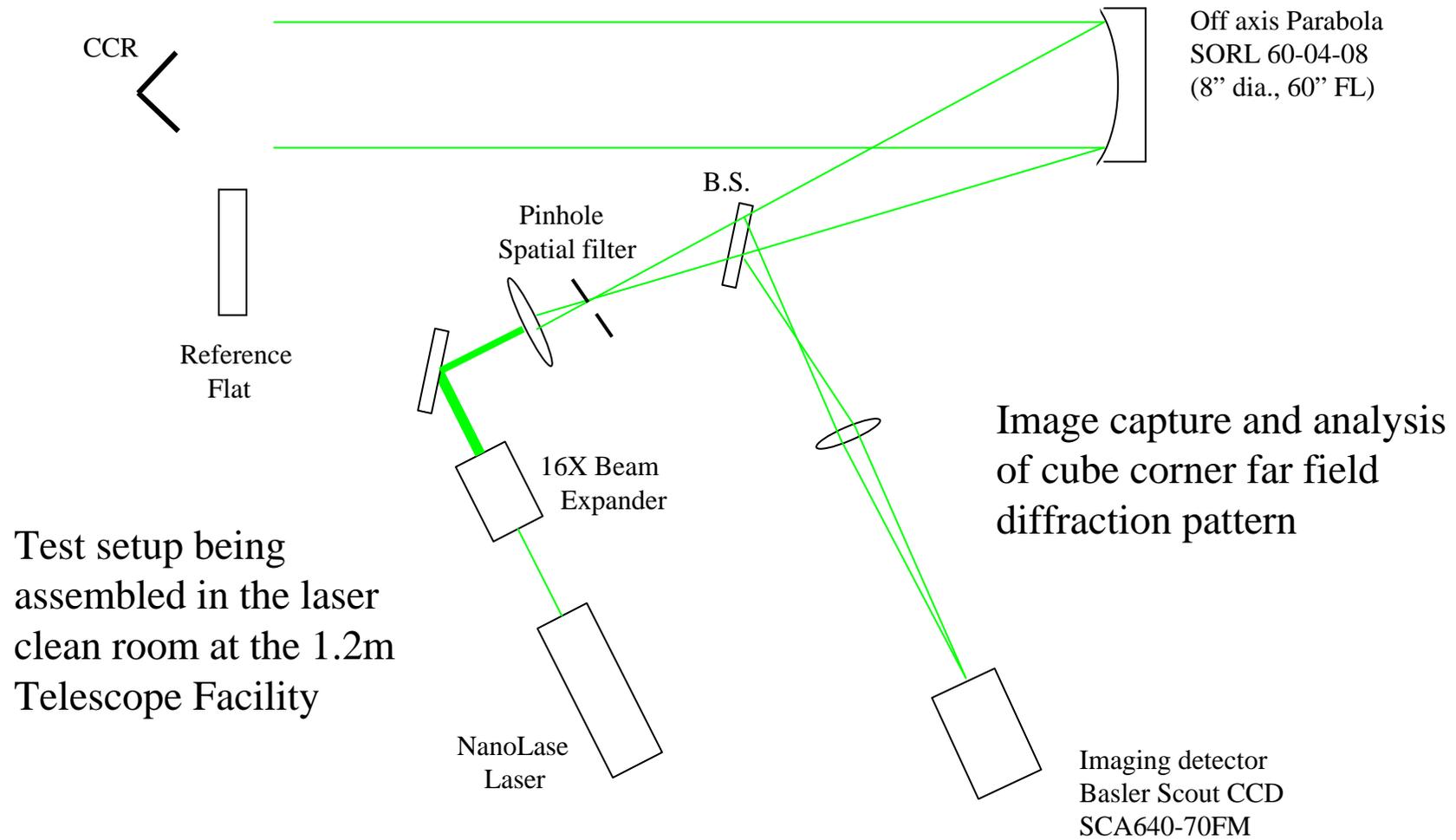
Jan McGarry, Dave Arnold, Tom Zagwodzki, John Degnan, Mike Pearlman

- NASA is requesting new GPS III satellites carry retro-reflectors (launch 2013).
- Space and mass on spacecraft will have tight constraints.
- Need to make the lidar cross-section for these new satellites at least 5x that of existing GPS arrays. Will allow more stations to range and more daylight ranging.
- To reduce the array mass, we are looking at hollow Zerodur cubes:
 - 1.5 inch diameter.
 - 37 cubes with holder (weight ~ same as existing GPS arrays).
 - Lidar cross section would be ~ 100 Million (ILRS recommended cross section)
- Hollow cubes (PLX) have flown before (ADEOS) but:
 - Difficult to gauge their performance for ILRS requirements.
 - Concern is cube integrity as well as performance over thermal cycles & gradients.

Status of Hollow Cube Work at GSFC

- Cubes on order from PLX for testing at GSFC (delivery Nov 2007).
- Team at GSFC is analyzing cube performance:
 - mechanical analysis has modeled cube & will analyze performance
 - thermal will determine expected temperature range & gradients
 - optical will provide analysis of far field patterns and interferograms
- Test equipment for far field measurement has been purchased and is being setup.
- Testing in lab and in thermal chamber will be used to verify mechanical analysis simulations and to determine cube performance under various thermal conditions.
- One or both of Zerodur cubes will go to Laboratori Nazionali di Frascati dell'INFN for further testing.

Cube Corner Optical Test Setup



T. Zagwodzki (Sep 2007)